

### Abstract

A material processing apparatus having an integrated toroidal plasma source is described. The material processing apparatus includes a plasma chamber that comprises a portion of an outer surface of a process chamber. A transformer having a magnetic core surrounds a portion of the plasma chamber. The transformer has a primary winding. A  
5 solid state AC switching power supply comprising one or more switching semiconductor devices is coupled to a voltage supply and has an output that is coupled to the primary winding. The solid state AC switching power supply drives an AC current in the primary winding that induces an AC potential inside the chamber that directly forms a toroidal  
10 plasma that completes a secondary circuit of the transformer and dissociates the gas.

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